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VALIDATION
SUMMARY
REPORT

FEDERAL
COBOL
COMPILER
TESTING
SERVICE

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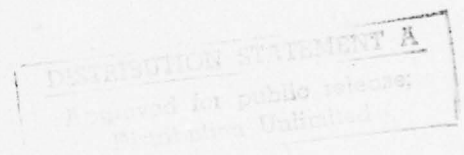
Department of the Navy
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Washington, D.C.
20376

FORTRAN COMPILER
VALIDATION SUMMARY REPORT

VALIDATION NUMBER FCVS66-VSR265
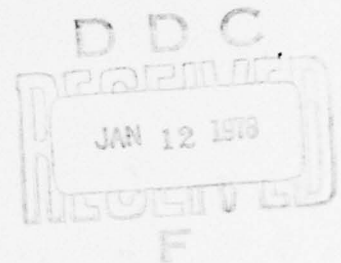
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DEPARTMENT OF THE NAVY
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16. Abstracts

This Validation Summary Report (VSR) for the ___IBM 370 series G1___ FORTRAN Compiler Version ___2.0___ (___MVS___ Version _3.7, JES 2_) provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1966 FORTRAN Standard (X3.9-1966). The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies; a section relating the categories of discrepancies to the language; and a detailed listing of discrepancies together with the tests which were failed.

17. Key Words and Document Analysis. 17a. Descriptors

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17b. Identifiers/Open-Ended Terms
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FORTRAN COMPILER VALIDATION

1. Validation Number   FCVS66-VSR265

2. Vendor   International Business Machines

3. Mainframe   IBM System 370/168

4. Compiler Identification   FORTRAN IV G1
RELEASE 2.0

5. Operating System Identification   MVS, Release 3.7, JES2

6. Compiler Validation System Version Number FCVS66 1.2

*PLEASE NOTE. The Department of the Navy may make full and free public
disclosure of the Validation Summary Report (VSR) in accordance with the
"Freedom of Information Act" (5 U.S.C. #552). The results of this valida-
dation are only for the purpose of satisfying United States Government
requirements, and apply only to the Computer System, Operating System
release, and compiler version identified in the VSR. The FORTRAN Compiler
Validation System is used to determine, insofar as is practical, the degree
to which the subject compiler conforms to American Standard FORTRAN,
X3.9-1966. Thus, the VSR is necessarily discretionary and judgmental.
The United States Government does not represent or warrant that the state-
ments, or any one of them, set forth in the VSR are accurate or complete.
The VSR is not meant to be used for the purpose of publicizing the findings
summarized therein.

For information concerning this compiler you can contact the vendor's
designated representative named below:

    Jay Valentine
    Federal Support Center
    IBM Corporation
    10401 Fernwood Road
    Bethesda, Maryland   20034

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SECTION 1. INTRODUCTION

1.1 Purpose of the Validation Summary Report

The purpose of the Validation Summary Report (VSR) is to identify individual
FORTRAN language elements whose implementation does not conform to the language
specifications defined in American Standard FORTRAN, X3.9-1966.

1.2 Preparation of the VSR

The Validation Summary Report is prepared by analyzing the results of running
the FORTRAN Compiler Validation System (FCVS). The FORTRAN Compiler Validation
System consists of audit routines containing features of American Standard
FORTRAN, their related data, and an Executive Routine which prepares the
audit routines for compilation. Each audit routine is a FORTRAN program which
includes many tests and supporting procedures indicating the result of the
tests.

The testing of a compiler in a particular hardware/operating system environment
is accomplished by compiling and executing each audit routine. The report pro-
duced by each routine tells whether the compiler passed or failed the tests in
the routine. If the compiler rejects some language elements by terminating
compilation, giving fatal diagnostic messages, or terminating execution abnor-
mally, then the test containing the code the compiler was unable to process is
deleted. The audit routine is compiled again and execution is repeated.

The compilation listings and the output reports of the audit routines con-
stitute the raw data from which the members of the Federal COBOL Compiler
Testing Service produce a Validation Summary Report.

1.3 Organization of the VSR

The Validation Summary Report is made up of several sections whose contents
are described below.

    a. Section 2 summarizes the results of the compilation and execution
of the programs comprising the FORTRAN Compiler Validation System. Section 2
is divided into a subsection describing the syntax errors encountered while
compiling the FORTRAN audit routines, and a subsection describing the semantic
errors which occurred during execution of the FORTRAN audit routines.

    b. Section 3 contains information which describes the software environ-
ment in which the compiler was tested. This includes the name and version of
the operating system and the logical unit/physical device assignments used in
the programs comprising the FCVS. The options used with the compiler are also
given, and if applicable, the use of compiler optimization features is ex-
plained.

    c. Appendix A is the Validation Summary Working Document, a working
paper resulting from the compilation and execution of the FCVS. The VSR
is derived from Appendix A.

1.4. Use of the VSR

The Department of the Navy may make full and free public disclosure of the

Validation Summary Report (VSR) in accordance with the "Freedom of Information Act" (5 U.S.C. #552). The results of the validation are only for the purposes of satisfying United States Government requirements, and apply only to the computer system, operating system release, and compiler version identified in the VSR.

The FORTRAN Compiler Validation System is used to determine, insofar as is practical, the degree to which the subject compiler conforms to the FORTRAN Standard. Thus, the VSR is necessarily discretionary and judgmental. The United States Government does not represent or warrant that the statements, or any one of them, set forth in the VSR are accurate or complete. The VSR is not meant to be used for the purpose of publicizing the findings summarized therein.

1.5 Sources of Additional Information

The detailed FORTRAN language specifications are given in the publication "American Standard FORTRAN, X3.9-1966", available from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

An explanation of the FORTRAN Compiler Validation System is contained in the FCVS User's Guide. This document explains how to run the compiler validation system. The User's Guide and a magnetic tape containing a copy of the FCVS programs are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia, 22151. (Ordering information can be obtained from the Federal COBOL Compiler Testing Service.)

SECTION 2. DETAILED EVALUATION OF ERRORS.

This section summarizes the results of the compilation and execution of the programs comprising the FORTRAN Compiler Validation System (FCVS). The version of the FCVS used during this validation is shown inside the front cover of the VSR.

Section 2 is made up of two subsections. The first subsection describes each syntax error encountered during compilation of the audit routines, and the second subsection describes the semantic errors encountered during execution of the audit routines.

Each error or deviation noted in this section makes reference to a program contained in Appendix A (Validation Summary Working Document). This reference provides the documented results of an occurrence of errors/deviations detected during the running of the FCVS using the compiler within the environment identified in this document. The Validation Summary Working Document is presented in sequence by program number.

2.1 Syntactical Errors

2.1.1 The compiler would not accept a statement which uses 57 sets of nested
parentheses in an arithmetic expression. See FM045.

X3.9-1966 References: Section 6.1, Arithmetic Expressions
Section 7.1.1.1, Arithmetic Assignment Statement

2.2 Semantic Errors

No errors.

SECTION 3. SOFTWARE ENVIRONMENT.

The compiler referenced in this document was validated using the software environment described in this section. When using a modification of the described environment, the compiler may or may not continue to conform to the Standard. It should be noted that during the validation process, an attempt is made to validate as many different options as possible.

The use of compiler options, logical unit/physical device assignments, and any form of optimization which is not described in this report could cause the compiler to produce a program that does not perform according to the specifications of Standard FORTRAN. Only the environment described in this document has been used with this compiler to satisfy the validation requirements of the Department of the Navy.

1. Options or parameters used on the processor call statement for the compiler.

Options specified:

    a. Batch - Without Optimization.

        ```
        //XEQFT    EXEC FTG1CLG
        //         PARM.FORT='BCD,LOAD,SOURCE'
        ```

        With the 'BCD' option specified all conversion was performed successfully with the exception that the special characters "=+()" were not converted when contained within comment lines, within the Hollerith constants of data initialization statements, and within the Hollerith field descriptors of the FORMAT statements.

    b. Batch - With Optimization.

        This compiler does not have an optimization feature.

    c. Time-sharing.

        The time-sharing processing mode was not used to validate this compiler.

2. Logical Unit/Physical Device Assignments.

    a. Batch Compiler Runs.

    Printer Destined Files:

        Logical unit 06 was assigned to SYSOUT=*

    Tape Files:

        Logical unit 08 was assigned to a tape file by using the following JCL card.

        ```
        //FT08F001 DD UNIT=TAPEHI,VOL=SER=JBJ101,DSN=XXX
        ```

    Sequential Mass-storage Files:

Logical unit 08 was assigned to a mass-storage file by using the following JCL card.

//FT08F001 DD DSN=&XXX,UNIT=V3330,SPACE=(CYL,5)

Card Input Files:

Logical unit 05 was assigned to the card reader. The following JCL card preceeds the audit routine when using the card reader.

//FT05F001 DD *

b. Time-sharing Compiler Runs.

The time-sharing mode was not used to validate this compiler.

3. Optimization. The compiler may or may not have optimization features. If there was an optimization feature available, it was used during the validation process (during a separate execution of the Compiler Validation System) to determine if its use causes the compiler to produce a program which does not give the expected results. If the optimization is invoked through the compiler call statement then it is mentioned in paragraph 1 above. If it is invoked through the introduction of a compiler directing source program statement, it is shown below. Optimization which would require modification to source program statments is not considered in this report in that it is beyond the scope of the use of Standard FORTRAN and the validation process.

This compiler does not have an optimization feature.

4. Compiler.

FORTRAN IV G1, Release 2.0

5. Operating system.

MVS, Release 3.7, JES2

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APPENDIX A

VALIDATION SUMMARY WORKING DOCUMENT

This appendix is a working paper produced during the validation and documents the results of the compilation and execution of each of the programs comprising the FCVS. The results contained herein are based on the use of the compiler within the Validation Environment identified in this appendix. This appendix (Validation Summary Working Document) is not part of the official Validation Summary Report (VSR), and it is not intended to reflect in any way the compiler's usefulness or degree of conformance to the language specifications.

The reader of this appendix should keep in mind that the same problem area may appear in more than one program but is considered only as a single discrepancy, and the problem is reflected only once in the body of the VSR. (The VSR will in turn only reference the first occurrence of the problem in the appendix.)

This appendix is divided into four parts. The first part describes the Validation Environment. The second part lists the Monitor Input Cards used in creating a job control stream for execution in the batch mode. The third part shows the control cards required to compile and execute an individual program. The fourth part of the document is divided into two categories of information: compilation results and execution results. Information items, such as compiler warning messages, are included in the summary of compilation and execution results.

The reference document for FORTRAN is American Standard FORTRAN, X3.9-1966.

VALIDATION ENVIRONMENT

COMPILER IDENTIFICATION: FORTRAN IV G1, Release 2.0

COMPUTER SYSTEM: IBM SYSTEM 370/168

OPERATING SYSTEM: MVS, Release 3.7, JES2

Each of the programs comprising the FCVS was compiled and executed in the batch mode. The programs which test I/O, FM100 through FM108, were run twice. These programs were first run with the output logical unit assigned to a tape device, and then rerun with the output logical unit assigned to a mass-storage device.

FCVS EXECUTIVE ROUTINE CONTROL CARDS

The FCVS Executive Routine was used to prepare the FCVS programs for execution in the batch mode. The Control Cards used as input to the FCVS Executive Routine together with the job control stream for executing the Executive Routine are listed below:

```
//JBJ1GN00 JOB 3POA069K00060J,'VALENTINE',
//           MSGLEVEL=(0,0),NOTIFY=JBJ1,MSGCLASS=A,CLASS=B
//JOBLIB   DD  DSN=J1F.NAVYLINK,DISP=SHR
//XEQEXEC  EXEC PGM=AS001
//FT06F001 DD  SYSOUT=*
//FT07F001 DD  DSN=JBJ1.NAVYSOUR.CNTL,DISP=SHR
//FT08F001 DD  DSN=&&OUT,DISP=(,PASS),UNIT=V3330,SPACE=(CYL,(1,1))
//FT09F001 DD  DSN=JBJ1.FM015INP,DISP=SHR
//FT05F001 DD  *

(FORTRAN audit routine selection cards)

X-060  I06 = 8
X-070  I07 = 8
X-080  I08 = 8
X-090  I09 = 8
X-100  I10 = 8
X-110  I11 = 8
X-120  I12 = 8
*LIST    U
*END-MONITOR
*BEGIN-UPDATE
*START,FM045
=04070C04120
*END-UPDATE
*END-INPUT
/*
//
```

CONTROL CARDS FOR RUNNING FCVS PROGRAMS

The job control stream for an individual program consisted of the following control cards:

```
//JBJ1GN00 JOB 3POA069K00060J,'VALENTINE',
//          MSGLEVEL=(0,0),NOTIFY=JBJ1,MSGCLASS=A,CLASS=B
//JOBLIB    DD  DSN=J1F.NAVYLINK,DISP=SHR
//XEQFT     EXEC FTG1CLG,
//          PARM.FORT='BCD,LOAD,SOURCE'
//FORT.SYSPRINT DD SYSOUT=*
//FORT.SYSIN  DD DSN=&&OUT,DISP=(OLD,DELETE)

(audit routine source program)

//LKED.SYSPRINT DD SYSOUT=X
//GO.FTO6F001  DD  SYSOUT=*
//GO.FTO8F001  DD  DSN=XXX,UNIT=TAPEHI,VOL=SER=JBJ101
//GO.SYSIN     DD  *
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ =+-*/(),.$
/*
//
```

FM001 through FM014

    A. Compilation

       No errors.

    B. Execution

       No errors.

FM015

    A. Compilation

       With the 'BCD' option specified on the FORTRAN compiler call statement, four special characters '=+()' were not converted within the Hollerith constants of the data initialization statements and the Hollerith field descriptors of the FORMAT statements. In addition, the same special characters were not converted within Comment Lines.

    B. Execution

       FM015 executed correctly when the data being read from the system input device and the data to which it was compared within the program were consistent in format and actual physical representation (i.e., either both converted or both unconverted).

FM016 through FM035

    A. Compilation

       No errors.

    B. Execution

       No errors.

FM036

    A. Compilation

       The message

       ********* 01) IGI013I SYNTAX

       was generated by the compiler when it encountered a blank source line. The compiler aborted with a severity code equal to 8. After deletion of the blank line the updated program compiled correctly. It is not clear in X3.9-1966 whether blank lines are permitted, so this is not a failure. However, BSR X3.9, the draft revision to X3.9-1966, states that lines with only blank characters in columns 1 through 72 are comment lines.

B. Execution

No errors.

FM037

A. Compilation

No errors.

B. Execution

No errors.

FM038

A. Compilation

The message

********* 01) IGI002I   LABEL   02)IGI013I   SYNTAX

was generated by the compiler when it encountered a blank source line.
The compiler aborted with a severity code equal to 8. After deletion
of the blank line the updated program compiled correctly. (See FM036.)

FM039 through FM044

A. Compilation

No errors.

B. Execution

No errors.

FM045

A. Compilation

The compiler discontinued compilation with the message

IGI031I ROLL SIZE EXCEEDED COMPILATION TERMINATED.

This message was produced prior to the statement in Test 759 which
uses 57 sets of nested parentheses in an arithmetic expression.
The statement being tested was

```
IVCOMP = ((((((((((((((((((((((((((((((((((((((((((((((((((((((((((
1        IVON01 / IVON02
2        ))))))))))))))))))))))))))))))))))))))))))))))))))))))))))
```

B. Execution

Test 759 was deleted due to the compilation error in A. above.

FM050 through FM062, FM080 through FM083, and FM097 through FM099

A. Compilation

No errors.

B. Execution

No errors.

FORTRAN I/O Routines - FM100 through FM108

These audit routines were executed with the output logical unit assigned to a tape device and rerun with the output logical unit assigned to a mass-storage device.

FM100 through FM108

A. Compilation

No errors.

B. Execution

No errors.

FM109

A. Compilation

With the 'BCD' option specified on the FORTRAN compiler call statement, the special character '+' (plus) was not converted when used with the Hollerith field descriptor of a FORMAT statement.

B. Execution

FM109 executed correctly when the plus (+) characters in the Hollerith field descriptors of the FORMAT statement were properly converted.